

SUPPORT FOR THE AMENDMENT

This Amendment amends Claims 41, 49-50, 55, 62-63, 68 and 77-78; and adds new Claims 80-83. Support for the amendments is found in the specification and claims as originally filed. In particular, support for new Claim 80 is found in Claims 48 and 54. Support for Claims 81-83 is found in Claims 41, 55 and 68, respectively. No new matter would be introduced by entry of these amendments.

Upon entry of these amendments, Claims 41-83 will be pending in this application. Claims 41, 55 and 68 are independent.

REQUEST FOR RECONSIDERATION

Applicants respectfully request entry of the foregoing and reexamination and reconsideration of the application, as amended, in light of the remarks that follow.

Applicants thank the Examiner for the courtesies extended to their representative during the personal interview on August 17, 2006.

As discussed at the personal interview, the present invention provides protective layers for optical coatings that improve the durability and scratch resistance of the optical coatings. In embodiments, an optical coating comprising an outermost layer of silicon nitride is coated with a protective coating consisting of a scratch propagation blocker (SPB) layer and a layer consisting essentially of carbon. Other embodiments do not include the layer consisting essentially of carbon.

Claims 41-67 are rejected under 35 U.S.C. § 102(e) over U.S. Patent No. 6,447,891 ("Veerasamy-891"). Veerasamy-891 discloses a low-E coating containing an outermost dielectric layer 7 of silicon nitride and a diamond-like carbon (DLC) inclusive layer 8. Veerasamy-891 discloses that between layers 7 and 8 can be an optional "additional metal

oxide (e.g., SnO<sub>2</sub>, ZnO, In<sub>2</sub>O<sub>3</sub>) inclusive layer". Veerasamy-891 at column 4, lines 38-38; column 5, lines 50-55.

However, Veerasamy-891 fails to suggest the stack structures of independent Claims 41 and 55 in which, on the optical coating's outermost layer of silicon nitride, "the scratch propagation blocker layer is a homogeneous layer ... comprising a material selected from the group consisting of Ti, Si, Zn, Sn, In, Zr, Al, Cr, Nb, Mo, Hf, Ta and W; oxides of Ti, Zr, Al, Cr, Nb, Mo, Hf, Ta and W; nitrides of Ti, Zn, Sn, In, Zr, Al, Cr, Nb, Mo, Hf, Ta and W; oxynitrides of Ti, Zn, Sn, In, Zr, Al, Cr, Nb, Mo, Hf, Ta and W; and mixtures thereof.". Thus, the rejection of Claims 41-67 under 35 U.S.C. § 102(e) over Veerasamy-891 should be withdrawn.

Claims 68-79 are rejected under 35 U.S.C. § 102(b) over U.S. Patent No. 6,586,102 ("Stachowiak-102"). Stachowiak-102 discloses an article coated with an anti-reflective system that can include a layer of Si<sub>3</sub>N<sub>4</sub> coated with SiO<sub>x</sub>N<sub>y</sub> or SiO<sub>2</sub>. Stachowiak-102 at abstract; Figs. 2 and 4.

However, Stachowiak-102 fails to suggest the stack structure of independent Claim 68 in which, on the optical coating's outermost layer of silicon nitride, "the scratch propagation blocker layer is a homogeneous layer comprising a material selected from the group consisting of Ti, Si, Zn, Sn, In, Zr, Al, Cr, Nb, Mo, Hf, Ta and W; oxides of Ti, Zn, Sn, In, Zr, Al, Cr, Nb, Mo, Hf, Ta and W; nitrides of Ti, Zn, Sn, In, Zr, Al, Cr, Nb, Mo, Hf, Ta and W; oxynitrides of Ti, Zn, Sn, In, Zr, Al, Cr, Nb, Mo, Hf, Ta and W; and mixtures thereof". Thus, the rejection of Claims 68-79 under 35 U.S.C. § 102(b) over Stachowiak-102 should be withdrawn.

Claims 68-79 are rejected under 35 U.S.C. § 102(e) over U.S. Patent No. 6,830,817 ("Stachowiak-817") or U.S. Patent No. 6,589,658 ("Stachowiak-658"). Stachowiak-817 discloses an article coated with an anti-reflective system that can include a layer of Si<sub>x</sub>N<sub>y</sub>

coated with  $\text{SiO}_2$ . Stachowiak-817 at abstract; Figs. 5 and 9. Stachowiak-658 discloses an article coated with an anti-reflective system that can include a layer of  $\text{Si}_x\text{N}_y$  coated with  $\text{SiO}_x\text{N}_y / \text{SiO}_2$ . Stachowiak-658 at abstract; Figs. 4 and 8.

However, Stachowiak-817 and Stachowiak-658 fail to suggest the stack structure of independent Claim 68 in which, on the optical coating's outermost layer of silicon nitride, "the scratch propagation blocker layer is a homogeneous layer comprising a material selected from the group consisting of Ti, Si, Zn, Sn, In, Zr, Al, Cr, Nb, Mo, Hf, Ta and W; oxides of Ti, Zn, Sn, In, Zr, Al, Cr, Nb, Mo, Hf, Ta and W; nitrides of Ti, Zn, Sn, In, Zr, Al, Cr, Nb, Mo, Hf, Ta and W; oxynitrides of Ti, Zn, Sn, In, Zr, Al, Cr, Nb, Mo, Hf, Ta and W; and mixtures thereof". Thus, the rejection of Claims 68-79 under 35 U.S.C. § 102(e) over Stachowiak-817 or Stachowiak-658 should be withdrawn.

Claims 41-67 are rejected under 35 U.S.C. § 103(a) over U.S. Patent No. 6,713,179 ("Veerasamy-179") or U.S. Patent No. 6,303,225 ("Veerasamy-225"), and Stachowiak-102 or Stachowiak-658 or Stachowiak-817. The Office Action at section 13 cites Veerasamy-179 and Veerasamy-225 for disclosing carbon coatings on substrates. The Office Action cites Stachowiak-102, Stachowiak-658 and Stachowiak-817 for disclosing various stack structures.

However, the cited prior art fails to suggest the stack structures of independent Claims 41 and 55 in which, on the optical coating's outermost layer of silicon nitride, "the scratch propagation blocker layer is a homogeneous layer ... comprising a material selected from the group consisting of Ti, Si, Zn, Sn, In, Zr, Al, Cr, Nb, Mo, Hf, Ta and W; oxides of Ti, Zr, Al, Cr, Nb, Mo, Hf, Ta and W; nitrides of Ti, Zn, Sn, In, Zr, Al, Cr, Nb, Mo, Hf, Ta and W; oxynitrides of Ti, Zn, Sn, In, Zr, Al, Cr, Nb, Mo, Hf, Ta and W; and mixtures thereof". Thus, the rejection of Claims 41-67 under 35 U.S.C. § 103(a) should be withdrawn.

Claims 41-67 are rejected under 35 U.S.C. § 112, first paragraph, as assertedly failing to comply with the enablement requirement. In addition Claims 50 and 63 are rejected under

35 U.S.C. § 112, first paragraph, as assertedly failing to comply with the enablement requirement. In particular, the Office Action asserts

The claims provide for a **metal oxynitride layer**, which is only provided for in the original disclosure after the removal of the carbon layer .... Office Action at sections 2-3 (emphasis added).

However, the original specification discloses:

As discussed above, in embodiments the SPB layer can be combined with a carbon protective layer on top of the SPB layer. **In other embodiments**, the SPB layer can form the **only protective layer** on an optical coating. An SPB layer can help to prevent scratching and scratch propagation on handling, even without a protective carbon layer.

In embodiments of the invention, the SPB layer can be formed by **oxidizing a diffusion barrier layer** used to provide corrosion protection to an optical coating before tempering. The **diffusion barrier layer** is a metal, metal suboxide or metal **subnitride** material including a metal element selected from Ti, Si, Zn, Sn, In, Zr, Al, Cr, Nb, Mo, Hf, Ta and W. Specification at page 9, lines 24-32 (emphasis added).

Thus, the original specification discloses embodiments in which an SPB layer, formed by oxidizing a metal subnitride, is the only protective layer on an optical coating. Because a metal subnitride containing oxygen is an oxynitride, the original specification enables an oxynitride SPB layer independent of the removal of a carbon layer. Thus, the rejections of Claims 41-67, and of 50 and 63, under 35 U.S.C. § 112, first paragraph, should be withdrawn.

Claims 51 and 64 are rejected under 35 U.S.C. § 112, first paragraph, as assertedly failing to comply with the enablement requirement. In particular, the Office Action asserts:

The claims provide for a doped carbon layer, but the disclosure calls for doping when 1-10% nitrogen is included in the inert gas which calls for a specific amount of dopant in the layer. Office Action at section 4.

However, the specification discloses:

An inert gas such as Ar, with or without small amounts of additional gases such as hydrogen and nitrogen, can be used in the plasma deposition processes to form the carbon layer. The presence of **1 to 10% nitrogen** in the inert gas favors the **deposition of graphitic carbon**. The nitrogen in the inert

gas can be used to dope the carbon with nitrogen. Specification at page 5, lines 23-26 (emphasis added).

Thus, the specification discloses that "1 to 10% nitrogen" in the inert gas produces "graphitic carbon". The specification does not disclose that doping carbon with nitrogen requires "1 to 10% nitrogen" in the inert gas. Because the specification does not call for a specific amount of dopant in the carbon layer, the specification enables the limitation of Claims 51 and 64 that "the layer consisting essentially of carbon is doped with nitrogen". Thus, the rejection of Claims 51 and 64 under 35 U.S.C. § 112, first paragraph, should be withdrawn.

Claims 41, 43-55, 58-68 and 71-78 are rejected under 35 U.S.C. § 112, first paragraph, as assertedly being based on a disclosure which is not enabling. In particular, the Office Action asserts:

A transparent substrate is critical or essential to the practice of the invention, but not included in the claims(s) is not enabled by the disclosure.  
Office Action at section 5.

However, a substrate that is "transparent" is implicit in independent Claims 41, 55 and 68. Independent Claims 41, 55 and 68 are each directed to a "transparent article" that comprises "a substrate". Because a substrate that is opaque will prevent the recited "transparent article" from being transparent, the feature of a substrate that is transparent is implicit in each of the claims. Claims 41, 55 and 68 are amended to make the implicit feature of a "transparent" substrate explicit. Thus, the rejection of Claims 41, 43-55, 58-68 and 71-78 under 35 U.S.C. § 112, first paragraph, should be withdrawn.

Claims 41-53, 55-56 and 68-78 are rejected under 35 U.S.C. § 112, first paragraph, as assertedly being based on a disclosure which is not enabling. In particular, the Office Action asserts:

The carbon layer having a thickness from 1 to 10 nm is critical or essential to the practice of the invention, but not included in the claim(s) is not enabled by the disclosure. Office Action at section 6.

However, the specification discloses:

The carbon layer **can be** from 1 to 10 nm thick. A carbon layer less than 1 nm thick does not provide **adequate** scratch resistance. A carbon layer more than 10 nm thick becomes **difficult** to remove completely in a atmosphere reactive to carbon. Specification at page 6, lines 1-3 (emphasis added).

Nowhere does the specification disclose that the carbon layer "must be" from 1 to 10 nm thick. The specification does not disclose that there is no scratch resistance below 1 nm. Furthermore, the specification does not disclose that it is impossible to completely remove a carbon layer more than 10 nm thick. Because the specification does not disclose that a carbon layer having a thickness from 1 to 10 nm is critical or essential to the practice of the invention, the rejection of Claims 41-53, 55-56 and 68-78 under 35 U.S.C. § 112, first paragraph, should be withdrawn.

Claims 41-47, 49-75 and 78-79 are rejected under 35 U.S.C. § 112, first paragraph, as assertedly being based on a disclosure which is not enabling. In particular, the Office Action asserts:

The scratch propagation layer having a thickness of 2 to 8 nm is critical or essential to the practice of the invention, but not included in the claim(s) is not enabled by the disclosure. Office Action at section 7.

However, the specification discloses:

The SPB layer **can be** from 2 to 8 nm thick. ... If the stoichiometric oxide or nitride SPB layer is thinner than 2 nm, or the metal SPB layer is thinner than 4 nm, then the SPB material exhibits a **decreased tendency** to inhibit the propagation of scratches. There is **little advantage** to an SPB layer thickness of greater than 8 nm, because the **scratch propagation inhibition** resulting from the SPB layer **saturates** at a thickness of about 8 nm and the influence of the SPB layer on the optical characteristics of an optical coating,

which must be taken into account, increases with SPB layer thickness.  
Specification at page 9, lines 11-20 (emphasis added).

Nowhere does the specification disclose that the SPB layer "must be" from 2 to 8 nm thick. The specification does not disclose that there is no inhibition of scratch propagation below 2 nm. Furthermore, the specification does not disclose that there can be no advantage to a SPB layer thicker than 8 nm. Because the specification does not disclose that a SPB layer having a thickness from 2 to 8 nm is critical or essential to the practice of the invention, the rejection of Claims 41-47, 49-75 and 78-79 under 35 U.S.C. § 112, first paragraph, should be withdrawn.

In view of the foregoing amendments and remarks, Applicants respectfully submit that the application is in condition for allowance. Applicants respectfully request favorable consideration and prompt allowance of the application.

Should the Examiner believe that anything further is necessary in order to place the application in even better condition for allowance, the Examiner is invited to contact Applicants' undersigned attorney at the telephone number listed below.

Respectfully submitted,

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